THE SPINAL CORD LESIONS IN A CASE OF FRACTURE OF THORACIC AND LUMBAR VERTEBRÆ.

BY ALOYSIUS O. J. KELLY, M.D.

THE clinical history of the case is as follows: W. T. A., male, aged 33 years, mason by occupation, was admitted to the Orthopœdic Hospital under the charge of Dr. Wharton Sinkler, March 28, 1895. He had had gonorrhœa when he was 25 years of age, but syphilis was denied. December 30, 1891, a scaffold on which the patient was working, gave way, causing him to fall twenty feet to the ground. He struck on his heels, then on his back. A brick standing on end struck him in the lumbar region to the right of his spinal column, causing a bruise which persisted for some time. On attempting to arise he could not move his legs. He began to immediately experience a sensation as of "pins and needles" from his waist down. For four days after the accident his legs were painful and felt cold. He had complete loss of control of his bladder and rectum. His sexual function was abolished.

Examination on admission to the hospital: No eruption or œdema; deep bed sores over the sacrum, on each heel, and on the calf of the left leg. No movements in the legs, no rigidity. Loss of control of the bladder and rectum. Complete anæsthesia below the crests of the ilea; touch, pain and temperature sense all abolished. No girdle pain. No tenderness on pressure over the nerve trunks. Elbow jerks equal on both sides; muscle jerks in arms normal. Knee jerks absent, not reinforcible. Tendon achilles jerks absent; plantar jerks absent; cremasteric jerks present but much retarded. Abdominal reflexes present. Urine contains a trace of albumin.

Electrical examination (Dr. Willets): No reaction to the faradic current in any of the muscles of the legs. Galv. anclc. > Kclc. 35 ma. required to secure reaction in tibialis anticus; calf muscles 30 ma. Galvanic qualita-

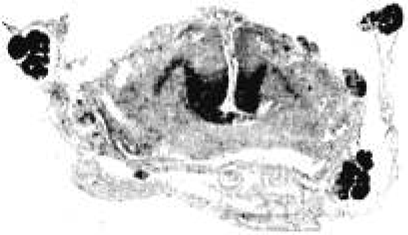

FIG. 1. One cm. above lesion. Photograph showing distortion of the cord, and complete degeneration of all the nerve fibres, except a few of those of the anterior column. Weigert-Pal preparation.

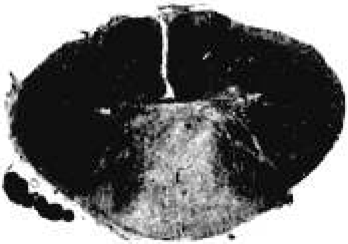

FIG. 2. Thoracic Cord, three cm. above lesion. Photograph showing degeneration of the nerve fibres of the posterior column and of those along the antero-lateral periphery (direct cerebellar and antero-lateral ascending tracts). Weigert-Pal preparation.

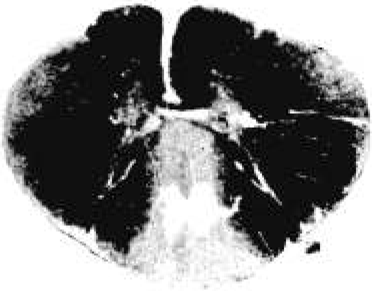

FIG. 3. Thoracic cord, nine cm. above lesion. Photograph showing degeneration of the postero-median, postero-external (partial), direct cerebellar and antero-lateral ascending tracts. Weigert-Pal preparation.

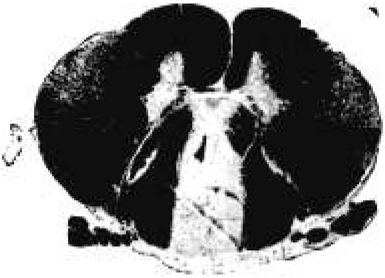

FIG. 4. Lower cervical cord, sixteen cm. above lesion. Photograph showing degeneration of the postero-median, direct cerebellar and antero-lateral ascending tracts. Weigert-Pal preparation.

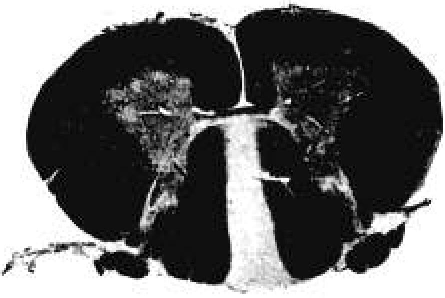

FIG. 5. Cervical enlargement, twenty-two cm. above lesion. Photograph showing degeneration of the postero-median, direct cerebellar and antero-lateral ascending tracts. Weigert-Pal preparation.

tive and quantitative change. Pupils equal and react well to accommodation and to light.

October 7, 1892, the patient died. The autopsy revealed a fracture dislocation of the first lumbar on the last dorsal vertebra; the dura mater adherent to the bodies of the vertebræ at the seat of fracture; the entire lumbar cord and the lower dorsal cord much flattened; chronic cystitis; slight dilatation of the ureters; pyelitis; abscesses in the kidneys.

For the specimen (the spinal cord) and the above notes, I am very much indebted to Dr. Charles W. Burr.

Microscopical examination(Weigert-Pal preparations): A section through the centre of the area of disease reveals total destruction of the cord, it being impossible to recognize any of its various constituents. What was the cord is now a mass of fibrous connective tissue, through which run a few partially degenerated nerve fibres. The nerve fibres of the cauda equina, particularly the most external ones, still retain their myeline sheath. Surrounding the structures of this region is a thick mass of dense fibrous tissue.

A section through the cord one centimetre above the former, shows great distortion of the cord, particularly of the postero-lateral regions, the component parts of which cannot be separately recognized. The cord is flattened from before backward, the posterior cornua being apparently displaced laterally, the posterior and lateral columns being crushed antero-posteriorly. The normal configuration of the anterior cornua and columns is well retained. There is complete degeneration of all the nerve fibres in this region of the cord, with the exception of a few along either side of the anterior median fissure, a few of the most centrally located of the anterior columns, a few skirting the medial and anterior border of the anterior cornua, and a few of the anterior commissure (Fig. 1).

A section through the cord 3 cm. above the first, shows the cord to be about normal configuration. Along the antero-lateral periphery there is a degeneration of the nerve fibres of varying extent, being greatest just a little external to the posterior cornua. With the exception of a few fibres bordering the tips of the posterior cornua, the fibres of the posterior columns are degenerated in their entirety (Fig. 2).

A section through the cord 9 cm. above the first reveals a complete degeneration of the fibres of the postero-median (Goll's) column, and some degeneration of the medial peripheral fibres of the postero-external (Burdach's) column. There is some degeneration of the fibres along the periphery of the cord between the anterior and posterior cornua of both sides. This degeneration is most marked about midway between the cornua, at which place it penetrates some distance into the substance of the cord (Fig. 3).

A section (lower cervical) 16 cm. above the first, shows complete degeneration of the posterior median columns, which degeneration towards the posterior commissure spreads out fan-shaped. The postero-external columns are otherwise unaffected. The degeneration along the lateral periphery noted in the previous section is more marked, and about midway between the anterior and posterior cornua extends quite a considerable distance into the substance of the cord (Fig. 4).

A section (cervical enlargement) 22 cm. above the first reveals the same general characteristics as those evident in the last described section (Fig. 5).

Below the seat of manifest lesion—in the conus—it is absolutely impossible to recognize any spinal cord structure. There is present a mass of connective tissue through which run a few partially degenerated nerve fibres.

When not otherwise mentioned the tracts are normal.

There is, therefore, complete disorganization of the cord at the seat of fracture, and above this region throughout the cord, ascending degeneration of the postero median, direct cerebellar, and antero-lateral ascending (Gower's) tracts; and for a short distance, degeneration of the postero-external columns. In other words, we find the anticipated spinal cord lesions of a fracture in this region. To be mentioned only is the degeneration of the direct cerebellar tract in conjunction with a fracture of the vertebræ so low down.

For the photographs, I am very much indebted to Dr. Schively.